

CLAIMS

- 1 A hot-chamber high-pressure diecasting method employing a fixed die, a
movable die, a mould cavity formed between the fixed and movable dies, and a
5 melt path comprising (i) a sprue channel formed in the fixed die for conveying
molten diecasting metal from the hot chamber into the die, (ii) a runner channel
formed between the fixed and moving dies at an angle to the sprue channel for
conveying molten metal from the sprue channel into the mould cavity via a gate
that is also formed between the fixed and movable dies, and (iii) a curved
10 transition channel for conveying molten metal from the sprue channel to the
runner channel through said angle; the method comprising the steps of:
- heating the sprue channel to a temperature that is higher than that of the
dies and approximating the melting point of the diecasting metal,
controlling the temperature of the dies so that they are below the melting
15 point of the diecasting metal,
- injecting a shot of molten metal into the sprue channel, transition channel,
runner channel and mould cavity,
- allowing molten diecasting metal remaining in the sprue channel to empty
therefrom while allowing diecasting metal in the runner channel and in portion of
20 the transition channel to solidify to form a runner and while allowing diecasting
metal in the mould cavity to solidify to form a product,
- separating the movable die from the fixed die, and
ejecting the product from the mould cavity together with the runner from the
runner channel and portion of the transition channel.
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- 2 A hot-chamber, high-pressure diecasting method comprising the steps of:
- injecting a shot of molten diecasting metal through a gate into a mould
cavity via a melt path comprising (i) a sprue channel formed in a fixed die and
having an inlet opening in an exterior surface of said fixed die, (ii) a smoothly
30 curved transition channel formed at least in part between said fixed die and a
movable die that cooperates with the fixed die to form said cavity and said gate,
and (iii) a runner channel formed between the fixed and movable dies, said runner
channel extending between said transition channel and said gate,

allowing molten diecasting metal remaining in the sprue channel and in portion of the transition channel after the shot to flow back out of the inlet of the sprue channel,

separating the movable die from the fixed die, and

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uniformly accelerating the molten diecasting metal as it flows along the melt path, the uniform acceleration of the diecasting metal being enabled by uniformly reducing the cross-sectional area of the channels of the melt path in the direction of flow.

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- a fixed die forming part of a mould cavity, part of a gate for admitting melt into the cavity and a runner channel for conveying melt to the gate, said fixed die having an exterior face,

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10 A die set according to any one of claims 6 to 8 wherein the cross-sectional area of the portion of the melt path which comprises the sprue channel, the transition channel and the runner channel reduces uniformly in the direction of melt flow so that the velocity of the melt increases uniformly within said melt path.

11 A die set according to any one of claims 6 to 10 wherein said angle is substantially 90°.

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12 A die set according to any one of claims 6 to 11 having an ejector pin slidingly located within one of said dies for movement into the transition channel so as to be adapted to eject diecasting metal that solidifies within the transition channel after a shot and after separation of the movable and fixed dies.

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13 A sprue insert-set for use in a high-pressure, hot-chamber diecasting apparatus having a fixed die and a moving die having respective parting faces that cooperate to define a runner channel, a gate and a cavity, the sprue insert-set comprising:

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a tubular sprue body insert forming a sprue channel and adapted for mounting within the fixed die at an angle to the parting face of the fixed die, said body insert having an outer end defining an inlet to the sprue channel adapted for location at an external surface of the fixed die, and said sprue insert having an inner end defining an outlet adapted for location in the vicinity of the parting face of the fixed die when the sprue insert is mounted within the fixed die,

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heating means associated with the body insert for heating the said insert, a first curved groove formed in the inner end of said body insert adapted to cooperate with a second curved groove associated with the moving die such that, when the body insert is mounted within the fixed die, said first and second grooves cooperate to form a curved transition channel connecting the outlet of the sprue channel to the runner channel when the dies are closed.

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14 A sprue insert-set according to claim 13 wherein:

the sprue channel and the first curved groove are tapered uniformly in the direction of melt flow so that the velocity of the melt will increase uniformly as it travels from the outlet of the sprue channel to the runner channel when the insert-set is in use and the dies are closed.

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15 A sprue insert-set according to claim 13 or 14 wherein said angle is substantially 90° and the first curved groove subtends substantially 90°.

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16 A sprue insert-set according to any one of claims 13 to 15 wherein the sprue body insert includes temperature sensor means.

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17 A sprue insert-set according to any one of claims 13 to 16 wherein the sprue body insert includes thermal insulation encompassing the heater means so as to mitigate the loss of heat from the sprue insert to the fixed die when the sprue insert-set is in use.

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18 A sprue insert-set according to any one of claims 13 to 17 including: a sprue tip insert adapted for mounting within the moving die, said tip insert having an inner end forming said second curved groove.

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19 A sprue insert-set according to claim 18 wherein said tip insert includes cooling means associated with the tip insert whereby the tip insert may be held at a temperature below that of the sprue body insert when the insert-set is in use.

20 A sprue insert-set according to claim 18 or 19 wherein said tip insert includes temperature sensor means and thermal insulation adapted to mitigate thermal transfer between said second insert and the moving die.
